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Source: Journal of Insect Science, 4(24) : 1-3

Published By: Entomological Society of America

URL: https://doi.org/10.1673/031.004.2401

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Posada F, Vega FE, Rehner SA, Blackwell M, Weber D, Suh S-O, Humber RA. 2004. *Syspastospora parasitica,* a mycoparasite of the fungus *Beauveria bassiana* attacking the Colorado potato beetle *Leptinotarsa decemlineata*: A tritrophic association. 3pp. *Journal of Insect Science*, 4:24, Available online: insectscience.org/4.24

Journal of Insect Science

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Scientific Note

Syspastospora parasitica, a mycoparasite of the fungus *Beauveria bassiana* attacking the Colorado potato beetle *Leptinotarsa decemlineata*: A tritrophic association.

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Received 9 March 2004, Accepted 12 May 2004, Published 15 July 2004

Abstract

A tritrophic association is reported, involving a Colorado potato beetle (*Leptinotarsa decemlineata*) infected with *Beauveria bassiana*, which in turn was infected with *Syspastospora parasitica*.

Keywords: biocontrol, mycoparasites, entomopathogens, insect pathology, *Leptinotarsa*, *Hypothenemus*

Results

As part of a program for sampling *Beauveria bassiana* infections in the Colorado potato beetle (*Leptinotarsa decemlineata* (Say); Coleoptera: Chrysomelidae) collected from a potato field at the Beltsville Agricultural Research Center in Beltsville, Maryland, USA, we observed that 1 out of ca. 300 infected beetles collected on July 25, 2003, at a site known as Sleepy Hollow (N 39° 01.978', W 76° 55.857'; 39 m above sea level), exhibited mycoparasitic growth on *B. bassiana* (Figure 1a-c). The mycoparasite was identified as *Syspastospora parasitica* (Tulasne) Cannon & Hawksworth.

The genus *Syspastospora* (Ascomycota: Sordariales) was erected by Cannon and Hawksworth (1982) to accommodate *Melanospora parasitica*, one of several species distinguished from species of *Melanospora* by characters that include a long perithecial neck composed of parallel hyphae and distinctive ascospores. In addition to *S. parasitica* two other species have been described: *S. boninensis* (Horie *et al.* 1986) and *S. tropicalis* (García *et al.* 2002), both isolated from soil. *S. parasitica* is known only as a mycoparasitic hyperparasite infecting various entomopathogenic clavicipitaceous fungi, e.g., *Beauveria*, *Hirsutella*, *Paecilomyces*, and some verticillioid species (Cannon and Hawksworth 1982). *S. parasitica* produces black perithecia with a small globose base and exaggeratedly long necks out of which copious quantities of cylindrical ascospores with markedly truncate ends are released (Fig. 1).

S. parasitica has been reported on various entomopathogenic fungi infecting insects, e.g., *B. bassiana* attacking the ash weevil *Stereonychus fraxini* (Coleoptera: Curculionidae) (Markova 1991); *Cephalosporium* spp. (= *Verticillium*) attacking the Kenya mealybug *Planococcus kenya* Le Pelley (Hemiptera: Pseudococcidae) (Masaba 1988); *Paecilomyces farinosus* attacking an unknown insect (ARSEF 5375; USDA-ARS Collection of Entomopathogenic Fungal Cultures, Ithaca, NY); *Paecilomyces tenuipes* attacking *Bombyx mori* (Lee and Nam 2000); *B. bassiana* infecting *Cydia pomonella* (L.) (Lepidoptera: Tortricidae); *Beauveria tenella* infecting *Melolontha* spp. (Coleoptera: Scarabaeidae); *Spicaria farinosa* (=*Paecilomyces farinosus*) infecting *Boarmia bistortata* Goeze (Lepidoptera: Geometridae); and *Spicaria fumosorosea* (= *P. fumosoroseus*) infecting *Thaumetopoea pityocampa* (Schiff.) (Lepidoptera: Thaumetopoeidae) (Müller-Kögler 1961). Ours is the first report of *S. parasitica* (ARSEF 7285) on a Colorado potato beetle infected with *B. bassiana*.

In our experience *S. parasitica* may go unobserved on the host. On two occasions when *B. bassiana* was transferred to potato dextrose agar from the Colorado potato beetle corpse, the presence of *S. parasitica* infection was not observed, although *S. parasitica* perithecia developed on the *B. bassiana* mycelial mat in approximately 60 days. Similar examples from inoculation of the

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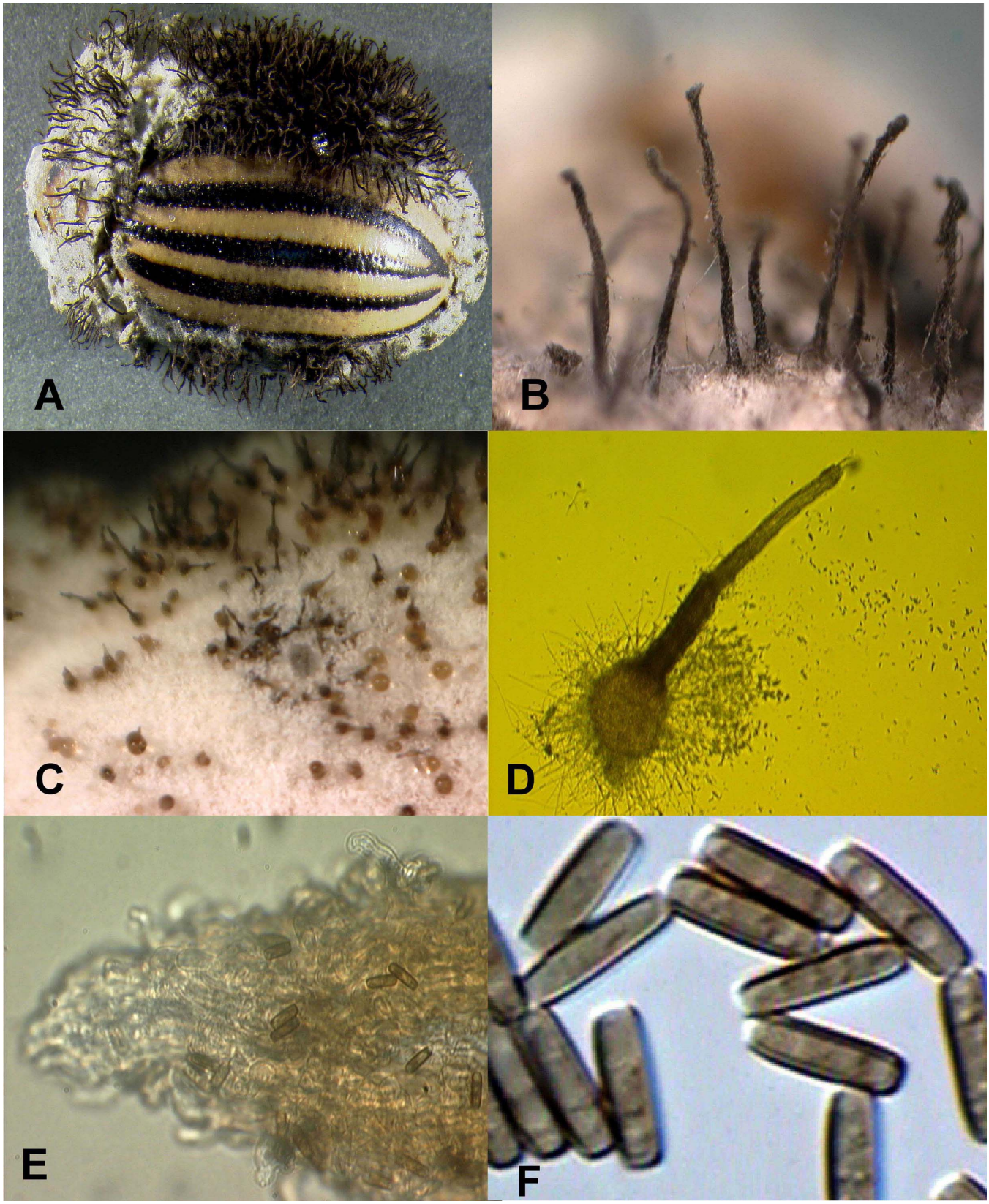


Figure 1. (A) A tritrophic association with a Colorado potato beetle infected with *Beauveria bassiana*, which in turn is infected with *Syspastospora parasitica*; (B) close-up of *S. parasitica* perithecia; (C) perithecia growing on *B. bassiana* culture; (D) dissected perithecium with released ascospores; (E) ascospores moving to the tip of the perithecium; (F) close up of ascospores.

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coffee berry borer, *Hypothenemus hampei* (Ferrari) (Coleoptera: Curculionidae: Scolytinae), simultaneously with *B. bassiana* and *Syspastospora* ascospores resulted in *B. bassiana*-induced coffee berry borer mortality in around five days; it was not until three months later that *S. parasitica* perithecia appeared and produced ascospores. The slow development of *S. parasitica* perithecia also occurred when cultures of *Syspastospora* were started with ascospores that were contaminated with *B. bassiana*. In this case, *B. bassiana* grew within days but *S. parasitica* perithecia did not appear until almost one month later. In contrast, perithecia plated directly over *B. bassiana* cultures developed new ones in about 4 days at 25°C.

Acknowledgments

We thank Ann Sidor for collecting the insects. Part of this study was supported by the National Science Foundation (DEB-0072741 to MB).

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